

I claim:

1. An arm assembly for an excavator, said arm assembly comprising:
an arm comprising a first hook including a first open mouth, said arm further comprising a first pin capturing system that selectively obstructs the first open mouth; and,
a link movable relative to said arm and comprising a second hook including a second open mouth, said second open mouth oriented toward said arm, said link further comprising a second pin capturing system that selectively obstructs the second open mouth.
2. The arm assembly as set forth in claim 1, further comprising an attachment control cylinder operably coupled to said link for varying the position of said link relative to said arm.
3. The arm assembly as set forth in claim 2, further comprising first and second guide links located on opposite sides of said arm, each of said guide links extending between and pivotally connected to said arm and said link.
4. The arm assembly as set forth in claim 1, wherein:
said first pin capturing system comprises: (i) a first pin-capturing member movably connected to said arm and movable between a first position where said first open mouth is configured to receive and release an associated attachment pin, and a second position, where said first pin-capturing member obstructs said first open mouth and captures an associated attachment pin in said first hook; and, (ii) a first hydraulic actuator operably coupled to said first pin-capturing member and operable to move said first pin-capturing member to and between its first and second positions; and,

said second pin capturing system comprises: (i) a second pin-capturing member movably connected to said link and movable between a first position where said second open mouth is configured to receive and release an associated attachment pin, and a second position, where said second pin-capturing member obstructs said second open mouth and capture an associated attachment pin in said second hook; and, (ii) a second hydraulic actuator operably coupled to said second pin-capturing member and operable to move said second pin-capturing members to and between its first and second positions.

5. The arm assembly as set forth in claim 4, wherein said first and second pin capturing members are slidably movable between said first and second positions relative to said arm and link, respectively.

6. The arm assembly as set forth in claim 4, wherein said first and second hydraulic actuators comprise first and second hydraulic cylinder connected to said first and second pin-capturing members, respectively.

7. The arm assembly as set forth in claim 4, wherein:

a portion of said arm that defines said first hook comprises a first slot, and wherein said first pin-capturing member spans said first open mouth and comprises a first tip portion that is slidably received in said first slot when said first pin-capturing member is moved to said second position; and,

a portion of said link that defines said second hook comprises a second slot, and wherein said second pin-capturing member spans said second open mouth and comprises a second tip portion that is slidably received in said second slot when said second pin-capturing member is moved to said second position.

8. The arm assembly as set forth in claim 7, wherein said first and second tip portions each comprise a wedge-shaped portion.
9. The arm assembly as set forth in claim 1, wherein said first pin-capturing member comprises a C-shaped retainer defining a partially cylindrical recess.
10. The arm assembly as set forth in claim 1, further comprising a stop pin, wherein said arm defines first and second receiving locations for said stop pin, and wherein said stop pin engages said first pin-capturing member and prevents movement of said first pin-capturing member from its second position to its first position when said stop pin is inserted in said second receiving location.
11. The arm assembly as set forth in claim 1, further comprising a stop pin, wherein said link defines first and second receiving locations for said stop pin, and wherein said stop pin engages said second pin-capturing member and prevents movement of said second pin-capturing member from its second position to its first position when said stop pin is inserted in said second receiving location.
12. The arm assembly as set forth in claim 1, wherein said link comprises a first axial end and a second axial end, said second hook is adjacent said second axial end, and wherein said second mouth is oriented toward said arm and angled toward said first axial end of said link.
13. The arm assembly as set forth in claim 1, wherein said link comprises an inner surface oriented toward said arm and wherein said inner surface comprises an unobstructed ramp surface that blends said inner surface into said second hook.

14. The arm assembly as set forth in claim 2, wherein:

said second hook comprises an inner partially-cylindrical surface defined by a radius centered at an origin, said inner surface extending for not more than 180 degrees between first and second ends and comprising a mid-point that lies halfway between the first and second ends.

15. The arm assembly as set forth in claim 14, wherein:

said link comprises first and second opposite axial ends and wherein said first axial end comprises a pair of aligned bores defined about a pivot axis, said aligned bores defining a pin-on location for pivotally connecting said link to said attachment control cylinder; and,

a hook angle of less than 90 degrees is defined between a first plane that passes through said mid-point and said origin, and a second plane that passes through said origin and said pivot axis.

16. The arm assembly as set forth in claim 1, wherein said arm comprises an engagement point with which said second hook of said link is selectively engageable to prevent swinging of said link relative to said arm.

17. An arm assembly for a machine, said arm assembly comprising:

an arm comprising a first hook including a first open mouth, said arm further comprising a first pin capturing system that selectively captures a first associated pin in said first hook; and,

a link movably connected to said arm and comprising a second hook that includes a second open mouth, said second open mouth oriented toward said arm and said link further comprising a second pin capturing system that selectively captures a second associated pin in said second hook.

18. The arm assembly as set forth in claim 17, wherein said first and second pin capturing systems non-rotatably capture the first and second associated pins in the first and second hooks, respectively.

19. An apparatus comprising an arm assembly and an attachment operably connected to said arm assembly, wherein:

said arm assembly comprises: (i) an arm comprising a first hook including a first open mouth, said arm further comprising a first pin capturing member that selectively captures a first associated pin in said first hook; and, (ii) a link movably connected to said arm and comprising a second hook that includes a second open mouth, said link further comprising a second pin capturing member that selectively captures a second associated pin in said second hook; and,

said attachment comprises: first and second attachment pin assemblies, said first attachment pin assembly non-rotatably captured in said first hook by said first pin capturing member, and said second attachment pin assembly non-rotatably captured in said second hook by said second pin capturing member.

20. The apparatus as set forth in claim 19, wherein said second open mouth of said second hook is oriented toward said arm.

21. The apparatus as set forth in claim 20, wherein said first and second pin capturing members are operatively connected to first and second hydraulic actuators.

22. An attachment comprising:

a body;

first and second spaced-apart ribs connected to said body;

first and second spaced-apart pins extending between said first and second ribs;

first and second sleeves rotatably positioned on said first and second pins.

23. The attachment as set forth in claim 22, wherein said first and second pins are restrained against rotation relative to said first and second ribs.

24. The attachment as set forth in claim 22, wherein said first and second sleeves each comprise:

a first seal connected thereto and sealingly engaged with said first ribs;
and,

a second seal connected thereto and sealingly engaged with said second rib.

25. The attachment as set forth in claim 22, wherein said first and second sleeves each include first and second bearing surfaces that are slidably engaged with said first and second ribs, respectively.

26. A sleeve for connection to an attachment pin, said sleeve comprising:

a tubular portion comprising a cylindrical outer surface and defining a through-bore adapted for receipt of an attachment pin;

first and second spacers connected to opposite first and second ends of said tubular portion, said first and second spacers defining respective first and second bearing surfaces that face outwardly away from each other; and,

first and second seals connected to said first and second spacers and overhanging said first and second bearing surfaces, respectively.

27. The sleeve as set forth in claim 26, wherein said first and second spacers each comprises at least one lubrication channel defined therein and in communication with said through bore.

28. A method of coupling an attachment to an arm assembly, said method comprising:

moving a first open hook into engagement with a first pin of an attachment, said first open hook located at an end of an arm;

engaging a first pin capturing system to capture said first pin non-rotatably in said first open hook;

moving said arm to lift said attachment so that said attachment hangs freely from said arm via said first pin;

pivoting said arm and moving a link relative to said arm so that a second open hook located at an end of said link moves into engagement with a second pin of the attachment;

engaging a second pin capturing system to capture said second pin non-rotatably in said second open hook.

29. The method as set forth in claim 28, wherein said step of pivoting said arm and moving said link relative to said arm so that a second open hook moves into engagement with a second pin of the attachment comprises sliding engagement between said second pin and a ramp surface defined by said link and blending into said second open hook.